Comparing Choice Models Across Decision States: Some Preliminary Results

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Abstract

During the decision-making process consumers pass through a series of stages or states as they progress from being aware of a new product category and/or offering to the final purchase choice. This paper presents preliminary results of a survey of 1495 people as they simulate the purchase of a DVD recorder. Using conditional logit models, we analyse the preferences of two groups of consumers, those who are "in the market" and those who are "not in the market". The results show that the effects of sociodemographic and psychographic variables differ between the two groups but their preferences for particular attribute levels are similar.

Introduction

To assist in the understanding of consumer choice, a number of studies have suggested that consumers progress through a series of decision stages, or a hierarchical system of decision states, associated with the purchase of "high-involvement" products (eg, Nicosia, 1966; Howard and Sheth, 1969; Engel, Blackwell and Kollat, 1978; Louviere, 1981). These states begin with awareness, eventually resulting in decisions to purchase or not. An understanding of the various decision states and the factors that influence them are, therefore, vital for the understanding of consumer choice. Though there have been a number of papers that propose various frameworks for these states, there are few papers that have actually examined the distributions. There is work on particular states like awareness vs non-awareness or consideration vs non-consideration (Roberts and Lattin, 1991, 1997), or choice of brand (eg, Louviere, Hensher and Swait, 2000) and several studies have modelled multi-stage choice processes, in particular the role of consideration (e.g. Bronnenberg and Vanhonacker, 1996; Gensch, 1987; Swait and Ben-Akiva, 1987). Kardes *et al.* (1993) directly modelled transitions between a limited sample of states. Waller and Louviere (2003), Louviere, Waller and Smith (2003), and Waller *et al.* (2004) have presented a conceptual framework of the overall process and undertaken some modelling that indicates overall support for the basic framework. This paper will present preliminary results of a study on the relationship between consumers' decision states and their purchase behaviour towards DVD recorders. Using conditional logit models, responses to a DVD recorder choice experiment are analysed for two groups to determine differences in preferences across decision states for a new product.

Background

Although the term "decision state" is not well defined in the literature, decision states reflect the level of information that the consumer has encountered or obtained. Urban, Hauser and Roberts (1990, p. 409) presented a model in which "each consumer is represented by a

behavioral state that describes his/her level of information about his/her potential purchase". Their flow model proposed a number of states for the purchase of a car, including Awareness, In the Market, Visit Dealer, Information (word of mouth), and Purchase (buy car, buy other car, not buy car). During the process, "consumers flow from one state to another". Similarly, Urban, Hulland and Weinberg (1993, p. 49) proposed that "customers are defined as being in decision process states, and they flow from one state to another as a result of their search for information and marketers' actions". This suggests that each consumer can be classified as being in one of a set of discrete decision states. While the complete set of states is not defined in these papers, Louviere, Waller and Smith (2003) identified a hierarchy of states and defined five major states (six if "unaware" is included as an additional state), which are (1) awareness that a category option exists; (2) attitude/interest formation; (3) capability of acting on awareness and interest; (4) deciding whether to choose now, delay or never choose; and (5) deciding which one or more options to choose.

Prior studies on decision states indicate that between becoming aware of a product or product category and selecting a product through purchasing (or rejecting and no longer considering), consumers are "in the market"; that is, they are in a state where they are actively consider purchasing in the category and decide on such issues as: whether to search for (further) information, what to purchase, when to purchase or not to purchase. Oppewal *et al.* (2004) therefore proposed four basic consumer decision states: (1) Unaware, (2) Aware but not actively considering, (3) Aware and actively considering ("in the market"), and (4) Made purchase decision. In this paper we focus on decision states 2 and 3.

While they are in state 3, consumers make a sequence of decisions regarding what information to search for (eg, which attributes to find out about), where to search for information (eg, which store or website to visit), what information they encounter (eg, which attribute levels) and from what source (eg, TV commercial or word of mouth). When they are in state 3 (in the market), consumers will increase their knowledge about the category and learn in order to formulate their preferences. Consumers in decision state 3 will therefore have more stable preferences and be better able to express their preferences, for example, in a choice task.

Our study aims to investigate how preferences and information search patterns differ between consumers in different decision states when they are presented with a choice task. The present paper focuses on the differences in preference and choice model results between decision states 2 and 3. We hypothesise that choice models for consumers who are in the market will have better explanatory power than for those who are aware but are not considering purchasing in the category. We also expect attributes to have different effects in the two states. In addition, we will test if there are differences based on psychographic and sociodemographic variables.

Methodology

The data for this study were collected from a random sample of panel members of a nation-wide on-line panel in Australia. A total of 1495 people completed the survey, which comprised questions measuring decision states, a choice experiment measuring DVD recorder preferences, and a battery of attitudinal scales and demographic questions. The sample consisted of 52.5 % males (and 47.5% females) and some 42.7% were under 35 (and 46.5% between 35 and 55, and 10.8% over 55 years old). The sample therefore showed an

overrepresentation of males and younger people, as the national population is estimated as 49.7% males and 31.6% of the population 18 and over being under 35 (ABS, 2005).

Each decision state was measured with multiple items. States 1 (unaware) and 4 (have purchased) were measured with direct dichotomous (yes/no) questions such as "*I have never heard of DVD recorders*" (unaware) and "*I have purchased a DVD recorder*" (purchased). The other two states were measured with questions concerning consideration and search behaviours that would be expected of people who were currently searching for a DVD recorder. Sample questions included "*I have compared DVD brands"*, "*I have looked carefully at them in shops"*, "*I have discussed them with family and friends"* etc. A summary question was also asked where respondents indicated how much time and effort they had put into learning about DVD recorders. Responses were measured on a 5-point rating scale (1 = does not describe me at all; 5 = describes me very well). Respondents were categorised as either being in the market or not in the market based on their mean response to these questions.

The choice experiment presented respondents with a scenario where they were asked to suppose that they had just received a $1000 special gift voucher. This voucher could be spent on a limited number of options, including a DVD recorder or player, DVD discs, CDs, books or respondents could choose to donate the money to a charity. Respondents were told that they had to use the voucher within 12 months. If they spent more than $1000, they would have to make up the difference themselves. The scenario meant that every respondent was presented with an opportunity to obtain a DVD recorder if they wished, even if they had not yet considered purchasing one or if they did not have the means to purchase. Respondents were told that the vouchers could only be redeemed through a specific website that is not related to any existing retailer.

This paper reports results relating to DVD recorders. In the recorder choice sets, respondents were presented with two generic options that had seven attributes (brand, colour, number of DVD disks that the player can hold, built-in hard disk, combo player, warranty and price). They could choose to purchase either of the generic options, or choose neither, which meant spending their voucher money on DVD discs, CDs, books or donating the money to charity.

Results

We first described respondents according to the four main decision states. Some 3.1% of respondents were not aware of DVD recorders and 13.9% of respondents had already purchased a DVD recorder. The remaining 83% of respondents were aware of DVD recorders but had not yet purchased. They were classified as being in the market (19.3%) or as aware but not in the market (63.7%). Subsequent to this classification, two conditional logit models were estimated: one for those respondents who were identified as being in the market (Model 1) and the other for those who were aware of DVD recorders but not currently considering purchase (Model 2). As shown in the summary statistics reported in Table 1, both models are highly significant ($p < 0.01$). We expected the model estimated for respondents who are in the market and have searched information to have better explanatory power than the model estimated for those not in the market. This hypothesis was supported, as the explanatory power of Model 1 is much better, with a McFadden rho-squared value of 0.296, than that of Model 2, which has a rho-squared value of only 0.184. To test for the equivalence of the two models, we first tested for scale differences using the grid-search method recommended by Swait and Louviere (1993). This testing indicated that the scales of the two models were

statistically different (rescaled $\chi 2 = 69.25$, df = 22, $p < 0.01$). The constants are also substantially different, reflecting a higher propensity to choose DVD recorders by those in the market (Model 1) compared to those not in the market (Model 2).

After allowing for scale differences and model specific constants (including all interactions with psychographic, sociodemographic and technology variables), the models were no longer significantly different, as shown with a likelihood ratio test ($\chi 2 = 15.78$, df = 10, $p = 0.106$]. Hence, the attribute parameters are overall equivalent across the two decision states after rescaling. Inspection of the differences for separate attributes nevertheless suggests some differences that are worth exploring. Firstly, the brand names have a more pronounced effect in Model 1, suggesting that those who are in the market have a greater knowledge of the brand qualities. Secondly, warranty has a greater effect on those not in the market as shown in Model 2, suggesting that consumers who are less informed rely to a greater extent on warranties as a product quality cue. Finally, whereas the effect of price is clearly linear in Model 2, it is curvilinear in Model 1: those in the market prefer the middle price points instead of the highest or lowest price points. Possibly this is because respondents who are in the market have done a more extensive search in the category and hence can better assess which price points represent good quality. Further analysis of these differences is ongoing.

Table 1: Conditional Logit Models

	Model 1: In the market			**Model 2: Aware, but not in the market**		
	Coeff.	**t-ratio**	**p-value**	**Coeff.**	**t-ratio**	**p-value**
Constant	1.666	2.092	0.036	0.483	1.894	0.058
PHILIPS	-0.122	-1.005	0.315	-0.010	-0.162	0.872
NEC	0.013	0.112	0.911	0.056	0.948	0.343
SONY	0.485	4.047	0.000	0.256	4.297	0.000
BLACK	0.016	0.275	0.783	-0.066	-2.207	0.027
DISKS	0.126	2.179	0.029	0.162	5.320	0.000
HD	0.704	11.582	0.000	0.527	16.652	0.000
COMBO	0.185	3.169	0.002	0.182	5.952	0.000
WARRAN	0.135	2.342	0.019	0.232	7.633	0.000
PR_LIN	-0.042	-1.454	0.146	-0.076	-4.880	0.000
PR_QUA	-0.151	-2.156	0.031	-0.024	-0.683	0.495
Psychographic scales						
NOVEL	-0.183	-0.829	0.407	0.408	5.126	0.000
EAP	0.267	1.422	0.155	-0.114	-1.333	0.183
Sociodemographic variables						
GENDER	0.845	2.348	0.019	0.015	0.113	0.910
AGE	-0.030	-0.201	0.840	0.120	2.214	0.027
INCOME	0.103	1.154	0.248	-0.102	-3.265	0.001
NOCHILD	-0.752	-2.028	0.043	-0.088	-0.629	0.529
Technology variables						
GCONSOLE	-0.872	-2.099	0.036	0.463	3.345	0.001
OTHDVDR	-1.400	-3.919	0.000	-0.005	-0.025	0.980
PAYTV	-0.295	-0.848	0.396	0.396	2.715	0.007
ANALOGUE	0.625	1.818	0.069	0.110	0.810	0.418
Summary Statistics						
McFadden rho squared		0.296			0.184	
Chi-square		316.457			719.618	
p-value		0.000			0.000	

The models also include variables relating to psychographic variables, sociodemographic variables and variables pertaining to the use of household technologies. Regarding the psychographic scales, consumer novelty seeking (NOVEL, see Manning, Bearden and Madden, 1995) was found to be significant in Model 2 only. The other scale included in this model, exploratory acquisition of products (EAP, see Baumgartner and Steenkamp, 1996) was insignificant. The effects of the sociodemographic variables are quite different in the two models. In Model 1 both gender and having children are significant, indicating that among those who are in the market, males and people who have children are more likely to choose a DVD recorder in our choice experiment. Neither of these two variables is significant in Model 2. Instead, age and income are significant, meaning that among those who are currently not in the market, older people and those on lower incomes are more likely to choose a DVD recorder.

Finally, the technology variables indicate the effects of having various technologies at home on the propensity to purchase a DVD recorder in our choice experiment. Again, there is quite a difference between the two groups of respondents. For those in the market, having a DVD recorder other than a stand-alone unit significantly reduces the probability of choosing a DVD recorder, as does having a game console. Having an analogue TV increases the probability, while pay TV is not a significant predictor. For those who are not currently considering purchase, both having a game console and subscribing to pay TV significantly increase the probability of choosing a recorder. The remaining two technology variables are not significant predictors for those who are not in the market.

Discussion

This paper presented some results from a study into how preferences and choice model results differ between consumers who are in the market, that is, they actively consider purchasing in a category, and those who are aware but not yet in the market to purchase from the category. The underlying idea of the study is that consumers pass through a series of stages or decision states as they progress from being aware of a new product category and/or offering to the final purchase choice. The study was conducted for the DVD recorder category using a discrete choice experimental approach. It was found that, as expected, choice models have a better fit for consumers who are in the market than for those who are not in the market. Consumers who are in the market are also more likely to purchase the particular product (DVD recorder) and there was some indication of differences in attribute preferences, although the overall test for attribute differences was not significant. Consumer-specific variables such as sociodemographics, psychographics, and technology variables also contributed to the goodness of model fit. However, it should be noted that these effects are conditional on someone being in a certain decision state. We are currently conducting analyses to predict decision state membership from the consumer-specific variables.

Our ongoing project will track the uptake of the DVD recorder category. So far, only 14% of our respondents had purchased a DVD recorder and about 19% are ‘in the market’. Using extended decision state measures and choice experiments that include ‘information acceleration’ conditions where respondents are exposed to different types of new product information, we hope to see what information is demanded and/or used in different decision states and how this affects choice outcomes and the uptake of a new product.

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